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The Use of Nonprescription Weight Loss Products Among Female Basketball, Softball, and Volleyball Athletes from NCAA Division I Institutions: Issues and Concerns

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Objective: To identify and describe the use of nonprescription weight loss products among female basketball, softball, and volleyball players from NCAA Division I institutions and to address health and sports performance issues concerning the use of weight loss products by female athletes.

Design and Setting: Mailed self-reporting questionnaire, sample of convenience. The Department of Physical Education at the University of South Carolina sponsored this study.

Subjects: The researchers sent 371 questionnaires to NCAA Division I athletic trainers of ten basketball teams, ten softball teams, and eleven volleyball teams. The recipients returned all of the questionnaires. Of the subjects, 106 played basketball, 138 played softball, and 127 played volleyball.

Measurements: A survey consisting of nine questions related to the use of weight loss products by NCAA Division I female athletes.

Results: Approximately 29% of the subjects reported using nonprescription weight loss products, which included general weight-reducing products, diuretics, and laxatives. More volleyball players (71%) used all types of these products than did softball (32%) or basketball (11.3%) players. More white athletes (32.3%) reported using the products than did African American athletes (6.7%). More volleyball players (23.6%) used diuretics than did softball (3.6%) or basketball (1.0%) players. Laxative use was greatest among volleyball players (18.8%), followed by basketball (1.8%) and softball (2.9%) players. Subjects typically reported purchasing nonprescription weight loss products over the counter (96.4%). The mean age of initial use was 16.2 years. Frequency of use increased during the out-of-sport season. The number one reason for using nonprescription weight loss products was for appearance enhancement (79.6%).

Conclusions: Based upon the results of this study, the use of nonprescription weight loss products is particularly common among volleyball players, but softball and basketball players also use them. Most subjects used these products during the out-of-sport season; therefore, information and intervention programs should target out-of-season use patterns. These programs should address the effects weight loss products have on sports performance and general health and should address issues relating to physical appearance.

Key Words: diuretics, laxatives

It is difficult to document the extent to which female college athletes use nonprescription weight loss products (NPWLPs). Several studies have addressed eating disorders among female college athletes, but few have focused on the use of NPWLPs.[1–4] Researchers who have investigated the use of NPWLPs have drawn from sports whose athletes are traditionally lean and have low body fat.[5–7]

We surveyed college female athletes from the sports of basketball, softball, and volleyball. The sports chosen for this study typically have athletes who are traditionally less lean and of higher body fat than other female athletes who have been studied previously. The purposes of this inquiry were to determine 1) the number of female athletes in these sports who use weight loss products, 2) the types of weight loss products used, 3) the age of initial use, and 4) the purpose for use of weight loss products. NPWLPs are commonly referred to as over-the-counter weight reduction products other than those classified as diuretics or laxatives. However, for the purposes of this study, NPWLPs will refer to all such products, including diuretics and laxatives, unless otherwise specified.

METHODS

This study involved NCAA Division I female college athletes who participated in the sports of basketball, softball, and volleyball during the 1994–95 school year. Participants were from institutions located in the southeast and eastern parts of the United States. We sent letters to coaches of teams who participated against the University of South Carolina female basketball, softball, and volleyball teams during the 1994–95

school year and asked that their athletes be permitted to participate. Of the 31 coaches contacted, all agreed to allow their athletes to participate in the study.

We also contacted the individual certified athletic trainer for each of the 31 teams and asked them to participate in the study. All indicated interest in the study and agreed to participate and serve as administrators of the questionnaire. The certified athletic trainers asked all team members of the 31 teams to participate in the study. Athletes had the option to participate or not participate in the study. All team members agreed to participate in the study. This study was approved by the Ethics Committee of the College of Education Faculty Affairs Committee, University of South Carolina, Columbia, SC.

We gave each certified athletic trainer verbal and written instructions for administration of the questionnaires. The certified athletic trainers administered the questionnaires in a quiet setting, such as in a classroom or locker room, where there would be no interruptions. The certified athletic trainers gave each athlete a packet, which included a questionnaire, envelope, description of the study, and two consent forms. The athlete completed the questionnaire and signed both of the consent forms. The certified athletic trainers proctored the completion of the questionnaires. After completing the questionnaire, the athlete placed it in the envelope, sealed it, and marked the seal with an X. The athlete gave the sealed envelope to the certified athletic trainer, along with one signed consent form (keeping the other form for her files). Each athletic trainer returned all envelopes and consent forms to the researchers. We mailed a total of 371 questionnaires to the certified athletic trainers, and the athletic trainers returned all 371 questionnaires. Questions on the survey included 1) types of nonprescription weight loss products used, including general products (eg, Slim-Fast (Slim-Fast Nutritional Foods International, Inc, West Palm Beach, FL) and Sweet Success (Nestlé USA, Inc, Glendale, CA), diuretics, and laxatives); 2) age of initial use of NPWLPs; 3) frequency of NPWLP use in season and out of season; 4) why athletes choose to use NPWLPs, and 5) why athletes choose not to use NPWLPs.

We computed frequency and percentage distributions collectively on the total population and separately on all sports teams, using SPSS-X software (release 2.0, SPSS, Chicago, IL) to calculate means.

RESULTS

Of the 371 participants, 28.6% (n = 106) were basketball players, 37.2% (n = 138) were softball players, and 34.2% (n = 127) were volleyball players. Ages of the participants ranged from 17 to 23 with a mean age of 19.5 years. White participants accounted for 78.4% (n = 291), 18% (n = 67) were African American, and 3.5% (n = 13) were from other ethnic backgrounds. Most participants (60.1%, n = 223) were considered starters in their respective sport, and 55.8% (n = 207) had grade point averages of 3.0 or higher on a 4.0 scale. The majority of the athletes lived in residence halls (62.2%, n = 231).

Nearly 30% (28.8%, n = 107) of the participants used NPWLPs. More volleyball players (71%) used these products than did softball (32%) or basketball (11.3%) players. More white athletes (32.3%, n = 94) reported using NPWLPs than did African American athletes (6.7%, n = 10).

More volleyball players (23.6%, n = 30) used diuretics than did softball (3.6%, n = 5) or basketball (1.0%, n = 1) players. Laxative use was greatest among volleyball players (18.8%, n = 24) followed by basketball (1.8%, n = 2) and softball (2.9%, n = 4). Among white athletes, 7.9% (n = 23) reported using diuretics and 7.2% (n = 21) laxatives. Of the ten (6.7%) African Americans who reported using NPWLPs, they used laxatives (40%, n = 4) more often than diuretics (20%, n = 2). Subjects typically reported purchasing NPWLPs over the counter (96.4%) versus obtaining them from a friend (4.6%) (Total is 101% because subjects could choose more than one answer).

Initial Age of Nonprescription Weight Loss Product Use

NPWLP use began before age 18, with a mean age of 16.2 years. Softball players reported initial use of NPWLPs at a younger mean age (15.5 years) than did volleyball (16.5 years) or basketball (16.6 years) players. African American athletes started using NPWLPs at a younger mean age (15.3 years) than did white athletes (16.1 years).

Frequency of Nonprescription Weight Loss Product Use

Most athletes who used NPWLPs did so between 2 and 7 days per week. All participants (basketball 66.7%, softball 58.3%, and volleyball 66.7%) reported using NPWLPs less during the season than out of season. Forty-four percent of volleyball players used these products four or more times during the season, as compared with 50% out of season. Thirty-three percent of softball and basketball players used the products four or more times per week during the season, compared with 53.3% and 66.7%, respectively, out of season. White and African American athletes reported the same usage pattern, ie, the greatest frequency during the off season.

Why Do Female Athletes Use Nonprescription Weight Loss Products?

Using a 3-point Likert scale (1 = not important, 2 = somewhat important, 3 = very important), female athletes ranked why they chose to use or not use NPWLPs. Most female athletes (79.6%) indicated that the use of NPWLPs for weight loss was very important. Fifty-two percent thought that using NPWLPs to make them feel good was very important. Almost 25% indicated that using NPWLPs was very important to the enhancement of their sports performance.

Those who chose not to use nonprescription weight loss products did so because of concerns about the effects NPWLPs

have on health (82.9%), the effects on athletic performance (63%), and the use of NPWLPs as a means of cheating (33.2%).

DISCUSSION

There are a variety of over-the-counter NPWLPs. Laxatives and diuretics are popular because of their effect on moving water and waste from the body quite rapidly. Many of the athletes in this study reported using NPWLPs to enhance appearance. It must be noted that these products do not decrease fat; rather, they decrease the water content of the body.[8,9] Laxatives and diuretics can account for two major conditions that often affect both health and athletic performance: potassium deficiency and dehydration. It is interesting to note that our study revealed that 29% of Division I female athletes participating in the sports of basketball, softball, and volleyball used NPWLPs. It is even more interesting that 71% of the volleyball players reported using these products. Results of similar studies found 25% of female athletes who participate in the sports of gymnastics, softball, tennis, track and field, field hockey, volleyball, basketball, golf, and swimming[6,10] practice pathogenic weight control behaviors, including the use of weight loss products. Regardless of who or how many female athletes use NPWLPs, there are detrimental effects on both general health and sports performance.

The use of laxatives and diuretics causes potassium deficiency.[9,11] Low potassium levels cause disturbances in electrolytes, acid-base balance, and nerve impulse transmission. Nervous disorders in the heart may be expressed as life-threatening cardiac anomalies. Although many athletes with abnormally low potassium levels are asymptomatic, there is no way to predict if and when a life-threatening cardiac arrhythmia will occur.[12] Non-life-threatening clinical signs and symptoms in the athletic population may include muscle cramping, muscle weakness, and cardiac weakness.[8,9]

Potassium's role in energy production may also affect the athlete's performance. Potassium assists in the transportation of glucose into the muscle cells, the storage of glycogen, and the production of high-energy compounds.[9,13] Metabolic insufficiency may adversely affect carbohydrate metabolism and contribute to muscle fatigue and injury.[14]

Laxative/diuretic-induced dehydration has a negative influence on the renal, thermoregulatory, and cardiovascular systems. The dehydrating effects of laxatives and diuretics cause the kidneys to increase the specific gravity of urine. Although the change is transient, repeated dehydration episodes may cause kidney problems later in life.[15] Additionally, laxative abuse causes volume depletion, which may lead to renal insufficiency.[16]

Dehydration also affects thermoregulation. The dissipation of body heat is largely dependent on the evaporation of sweat, particularly in warm environments. Failure to dissipate body heat due to dehydration may lead to hyperthermia.[17] A mild state of dehydration may express itself as fainting, fatigue, or nausea. Severe dehydration may result in a life-threatening heat injury, heat stroke.[9]

The use of NPWLPs may lead to dehydration and hyperthermia, and consequently to central nervous system distress. Dizziness and confusion are typically observed when the body fails to dissipate heat. Elevated body temperatures may also cause central nervous system fatigue, and, as a result, athletic performance suffers.[9] Body water deficits from diuretic use increase the viscosity of the blood and reduce venous return. It is reasonable to assume that a reduced venous return followed by a decreased ventricular filling leads to a decrease in stroke volume and subsequently a decrease in cardiac output. A reduction in cardiac output may explain decreases in maximal aerobic power and physical work capacity deficits. Diuretic-induced dehydration also reduces blood plasma levels.[18] Armstrong et al[1] reported that performance deficits were greater in subjects with diuretic-induced dehydration who were participating in races of greater distances. They were of the opinion that hyperthermia may have been the physiologic mechanism that caused greater performance deficits in dehydrated individuals during events of longer duration. Thus, the reduced plasma volume caused by diuretic use and leading to dehydration decreases exercise performance. Additionally, reduced stroke volume requires the heart to beat faster, affecting an individual's perceived exertion level.

Also, dehydration has deleterious outcomes on other physical performance components: strength, anaerobic power, lactate threshold, and aerobic power.[19,20] Webster et al[18] examined the effects of dehydration on seven intercollegiate athletes. They concluded that typical weight loss methods, including dehydration, that are practiced by wrestlers negatively affect strength, anaerobic power, lactate threshold, and aerobic power output. Although the literature fails to address the effects of dehydration on female athletes, it seems reasonable to infer similar conclusions.

This study highlights the use of NPWLPs among a group of female athletes who are traditionally not perceived to use these products. Weight loss products, particularly diuretics and laxatives, can have detrimental effects on health and sports performance. Diuretic and laxative use can put the female athlete at higher risk for medical complications such as electrolyte imbalances and cardiac arrhythmias. Female athletes already engage in strenuous physical activity, which demands an increase in productivity of the musculoskeletal and cardiovascular systems. The use of diuretics and laxatives may put these athletes at greater risk for musculoskeletal injuries, heat-related disorders, and cardiovascular abnormalities. Although some athletes may assume these products improve performance and enhance their appearance, the evidence suggests that these products, in fact, have deleterious influences on the renal, thermoregulatory, and cardiac systems. As a result, NPWLPs are considered ergolytic rather than ergogenic aids to performance and health.

It may be, based on our study, that information programs concerning the use and effects of NPWLPs for appearance and

performance enhancement need to be provided for female athletes, beginning in junior high school and continuing throughout their careers. However, we did not investigate the correlation between cognitive deficiency and the use of NPWLPs. Future studies addressing this relationship in order to understand the results of education and intervention programs may be informative. Until this research takes place, information and intervention programs are the only tools at our disposal.

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REFERENCES

1. Armstrong LE, Costill DL, Fink WJ. Influence of diuretic-induced dehydration on competitive running performance. *Med Sci Sports Exerc.* 1985;17:456–461.
2. Black D, Burckes-Miller M. Male and female college athletes: use of anorexia nervosa and bulimia nervosa weight loss methods. *Res Q Exerc Sport.* 1988;59:252–256.
3. Burckes-Miller ME, Black DR. College athletes and eating disorders: a theoretical context. In: Black DR, ed. *Eating Disorders Among Athletes: Theory, Issues and Research.* Reston, VA: American Alliance for Health, Physical, Education, Recreation and Dance; 1991:11–26.
4. Copeland PM. Renal failure associated with laxative abuse. *Psychother Psychosom.* 1994;62:200–202.
5. Dudek CG. *Nutrition Handbook for Nursing Practice.* Philadelphia, PA: JB Lippincott Co; 1993:168–169.
6. Fogelholm M. Effects of bodyweight reduction on sports performance. *Sports Med.* 1994;18:79–92.
7. Harris M, Greco D. Weight control and weight concerns in competitive female gymnasts. *J Sport Exerc Phys.* 1990;12:427–433.
8. Burckes-Miller ME, Black DR, Miller M, Black D. Male and female college athletes: prevalence of anorexia nervosa and bulimia nervosa. *Athl Train, JNATA.* 1988;23:137–140.
9. Mira M, Stewart PM, Vizzard J, Abraham S. Biochemical abnormalities in anorexia nervosa and bulimia. *Ann Clin Biochem.* 1987;24:29–35.
10. Murray R. Dehydration, hyperthermia, and athletes: science and practice. *J Athl Train.* 1996;31:248–252.
11. Pearl AJ. *The Athletic Female.* Champaign, IL: Human Kinetics Publishers; 1993:130–131.
12. Pomeroy C, Mitchell JE. Medical issues in eating disorders. In: Brownell KD, Rodin J, Wilmore JH, eds. *Eating, Body Weight and Performance in Athletes: Disorders of Modern Society.* Philadelphia, PA: Lea & Febiger; 1992:202–221.
13. Rosen LW, McKeag DB, Hough DO, Curley V. Pathogenic weight-control behavior in female athletes. *Physician Sportsmed.* 1986;14(1):79–86.
14. Sawka MN. Physiological consequences of hypohydration: exercise performance and thermoregulation. *Med Sci Sports Exerc.* 1992;24:657–670.
15. Schlabach G. Carbohydrate strategies for injury prevention. *J Athl Train.* 1994;29:244–254.
16. Thornton JS. Feast or famine: eating disorders in athletes. *Physician Sportsmed.* 1990;18(4):116–122.
17. Torranin C, Smith DP, Byrd RJ. The effect of acute thermal dehydration and rapid rehydration on isometric and isotonic endurance. *J Sport Med.* 1979;19:1–9.
18. Webster S, Rutt R, Weltman A. Physiological effects of weight loss regimen practice by college wrestlers. *Med Sci Sports Exerc.* 1990;22:229–234.
19. Wilkins J, Boland F, Albinson J. A comparison of male and female university athletes and nonathletes on eating disorder indices: are athletes protected? *J Sport Behavior.* 1991;14:129–143.
20. Williams, MH. *Nutrition for Fitness and Sport.* Dubuque, IA: Brown & Benchmark; 1995:246–247,252–253, 291.